CHEMICAL & ENGINEERING NEWS

C&EN

JULY 27, 1992

FINAL PROGRAM -- ACS NATIONAL MEETING IN WASHINGTON, D.C.

GERMAN CHEMICAL INDUSTRY

Attempts at unification fizzle out Page 7

CHEMICAL & ENGINEERING NEWS

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JULY 27, 1992

NEWS OF THE WEEK

- Biggest news from the International Conference on AIDS held in Amsterdam concerns reports of patients with AIDS-like symptoms but without HIV-1 or HIV-2 infection. Page 4
- NASA prepares for July 31 launch of space shuttle *Atlantis*, which will probe the use of a tethered satellite system. Page 4
- The U.S. team placed fourth, behind teams from China, Hungary, and Poland, in the 1992 International Chemistry Olympiad, concluded last week in Washington, D.C. Page 5
- Two candidates for directors on the ACS Board of Directors have been nominated by petition. Page 6
- Chemical companies showed some signs of financial recovery in the second quarter of 1992. Page 6

COVER: BASF's huge chemical complex at Ludwigshafen

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BUSINESS

Agricultural biotechnology firms extend their basic technologies to develop biological insecticides for common house and garden pests. Page 23

GOVERNMENT

Federal research labs' accounting practices are found to be lax, weakly controlled, and the cause of waste and misuse of millions of dollars. Page 26

Pilot program to aid female scientists who wish to continue their research careers after taking time off to raise children is initiated by NIH. Page 27

SCIENCE/TECHNOLOGY

Waste treatment method uses citric acid and bacteria to remove metals and radionuclides from soil, sludge, and sediments; new technique quickly identifies bacteria that will be most effective at metabolizing certain wastes. Page 35

BOOKS

Aspects of genetic engineering that cause the public concern are subject of a collection of essays by a diverse group of science, government, and law experts. Page 37

ACS NEWS

No petitions are scheduled for action by the ACS Council at the society's national meeting in August in Washington, D.C., but some are scheduled for committee discussion. Page 39

FINAL PROGRAM

ACS national meeting next month in Washington will feature more than 4200 papers in 504 technical sessions; exposition will comprise about 400 booths representing about 220 exhibitors. Page 41

NEWS FOCUS

Attempts to unify the German chemical industry falter as environmental concerns and recession delay the process, but industry's strength likely will overcome these obstacles. Page 7

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LETTERS

Fluoridation controversy

Your recent review of Brian Martin's book, "Scientific Knowledge in Controversy: The Social Dynamics of the Fluoridation Debate" (C&EN, June 29, page 76), prompted me to share my own public experience with this debate. Last December, I was appointed to advise the mayor and city council of Tucson, Ariz., on the benefits and risks of fluoridating our municipal drinking water. It appeared to be a challenging and exciting opportunity for a scientist. I was not disappointed.

Tucson is a city of 600,000 inhabitants that has relied on groundwater as its sole source of drinking water for the past 100 years. Approximately 200 public and private wells supply 100,000 acre-feet a year. Next year, Tucson will switch from wells to Colorado River water, supplied by an aqueduct to a newly constructed central treatment plant. This switch will permit the water utility to add chemicals at a central facility in a uniform manner.

As soon as the date was set for the initiation of water treatment, the local county board of health requested that the city add fluoride to the drinking water. The board claimed that optimum amounts of fluoride (0.8 ppm) would prevent decay in teeth and especially benefit poor children. The board of health was immediately joined by state and federal public health organizations. The city referred this matter to my subcommittee.

As a loyal ACS member, my first act was to distribute copies of Bette Hileman's excellent review article on this subject (C&EN, Aug. 1, 1988, page 26) to all nine members of my subcommittee. Next, I recommended Brian Martin's book for background reading. The subcommittee decided to limit its review to the scientific aspects of fluoridation and not to review the ethical, moral, and constitutional issue of involuntary medication.

During the three months of public hearings that followed, our subcommittee was lobbied with mountains of printed material and verbal testimony. These sessions were emotionally charged by pro- and antifluoridation advocates. I was personally labeled a "John Bircher" by a profluoridationist and labeled a "lackey of the chemical industry" by an antifluoridationist. Every argument, every claim, every uninformed public health official, and every personality involved in the Tucson controversy was a mirror image of the stereotypes described in Martin's book. Even our own committee members gradually assumed some of the stereotypical roles in Martin's book.

From a thorough review of the published data, our subcommittee concluded that the field epidemiology extolling the benefits of fluoridation was uneven and flawed. The same conclusion applied to the counterclaims of massive risks. We could draw no definite recommendations from these data.

However, the city of Tucson provided us with a unique opportunity to test the fluoridation hypotheses. Historically, this city has had discrete geographic areas of groundwater with high fluoride content (0.8 ppm) and areas of low fluoride content (0.3 ppm). Our committee had access to a recent dental screening of 26,000 elementary school children. When we plotted the incidence of tooth decay versus fluoride content in a child's neighborhood drinking water, a positive correlation was revealed. In other words, the more fluoride a child drank, the more cavities appeared in the teeth.

Since this was an unusual result, our subcommittee looked for other relevant factors. Family income was compared to tooth decay. An excellent inverse relation was found for these 26,000 children: the higher the income, the lower the number of decayed teeth. Other anecdotal evidence gathered by our committee included lack of access to dental facilities, poverty, diet,

Corrections

- June 29, page 26: The work on redox-dependent molecular recognition in proteins had two principal investigators, Alan F. Corin, senior scientist at Eastman Kodak's corporate research laboratories, as well as chemistry professor George L. McLendon at the University of Rochester. Both are affiliated with the NSF Center for Photoinduced Charge Transfer at the University of Rochester.
- July 6, page 21: California's South Coast Air Quality Management District has proposed trading nitrogen oxide emissions allowances, not nitrous oxides.

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Centocor reports loss, cuts staff under new plan

Centocor, the Malvern, Pa.-based biopharmaceutical company, is implementing a new business plan after rearranging its management and reporting a major loss for the first quarter of 1992. The $45.8 million loss included a special charge of $9 million to account for inventories of the company's monoclonal antibody product, Centoxin. A delay in FDA approval has been a major blow to the company's launch of Centoxin in the U.S., but the firm markets this and other products in Europe. In early May, Centocor rearranged its management team (C&EN, May 4, page 7) and now has a new collaborative strategy that includes forming alliances with established drug companies. The company will continue to reposition itself throughout 1992 with the goal of achieving profitability by the end of 1993. As part of its plan, staff will be cut at Centocor's headquarters and at manufacturing operations in Leiden, the Netherlands, and in St. Louis. The cuts will involve 225 people, or 15% of the company's employees.

Dexter to sell water treatment unit

Dexter Corp., Windsor Locks, Conn., has agreed to sell its water treatment division, Mogul Corp., to Diversey Corp. of Mississauga, Ontario. Diversey is part of the Canadian Molson Companies Ltd. Mogul, headquartered in Chagrin Falls, Ohio, had 1991 sales of $44 million and reported a profit. The division has facilities in Charlotte, N.C.; Phoenix; and Canada. The sale, which is expected to be completed in June, is likely to result in a capital gain for Dexter. In 1990, Dexter sold the European and Australian operations of its water treatment business to W. R. Grace.

Glitsch and Petrocel collaborate on DMT process

Dallas-based Glitsch Technology and the Mexican firm Petrocel have agreed to jointly develop and market improved dimethyl terephthalate (DMT) production technology. The two companies hope to fill a gap they believe exists as a result of Dynamit Nobel's and Hercules' discontinued development and licensing of DMT technology. Because DMT is a mature product, Glitsch and Petrocel will focus on increased yields and reduced energy consumption for its production. Development work will be conducted at Glitsch's R&D centers in Texas and Montana. Demonstration units are to be constructed at Petrocel's Altamira, Mexico, plant. DMT is one of two major feedstock materials for polyester production. As part of the Grupo Industrial Alfa, Petrocel is one of the world's largest producers of DMT.

Unocal completes polymers sale

Unocal has completed the sale of its emulsion polymers business to Rohm & Haas after overcoming Federal Trade Commission (FTC) objections. Sale price of the business was about $175 million. Philadelphia-based Rohm & Haas immediately sold the part of the business that makes acrylic polymers for architectural coatings to Union Carbide for an undisclosed sum. This move was made to satisfy FTC objections to the deal. Unocal reported 1991 sales for the emulsion polymers business were about $145 million. The polymers included in the transaction are sold to companies that produce paint, paper, textiles, adhesives, and carpet. Unocal's deal with Rohm & Haas includes six U.S. plants and a technical center in Charlotte, N.C. Carbide will receive technology for three acrylic coatings products and customer lists, but no manufacturing facilities. Product will be supplied from Unocal plants for up to one year as Carbide gears up for production.

BP Chemicals to sell specialties unit

Hythe Chemicals, a specialty chemicals unit of BP Chemicals, has been acquired by International Specialty Chemicals, a U.K.-based holding company, for an undisclosed price. Purchase of the unit is expected to be completed by the middle of the year. Involved are specialty monomers and plasticizers produced at Hythe, on the south coast of England. Associated businesses are also included in the sale.

Net profits up 78% for Rhône-Poulenc

Net after-tax profits for this year's first quarter at France's Rhône-Poulenc were $138 million, up 78% from those of the gloomy comparable period in 1991. Consolidated sales rose 3% to $3.86 billion. The company says although the economic climate remains unfavorable, improvements in productivity following restructuring in all the company's businesses have improved its profitability.

Courtaulds continues its profits growth

Courtaulds, the British specialty materials company, increased after-tax profits 5% for its fiscal year ended March 31, 1992, to $263 million. Sales for the company grew almost 2% from the previous fiscal year to $3.37 billion. Courtaulds had particularly good results in its fibers and films division, following its withdrawal from loss-making businesses, and as a result of a better balance between supply and demand in some areas. The company also noted that its new $85 million plant to make Tencel viscose fiber in Mobile, Ala., will be commissioned early next month.

Chemicals sag but stay in black at Shell

First-quarter 1992 chemical earnings for Netherlands-based Royal Dutch/Shell fell 76% from last year's first quarter to $36.5 million, and chemical sales slid 9% to $2.46 billion. Virtually all the chemicals profits came from U.S. operations; operating profits outside the U.S. were almost nil, compared with about $100 million in the past year's comparable period. Profitability declined, the company said, both because industry overcapacity has depressed selling prices, and because of depressed markets, particularly for bulk petrochemicals.

Hercules Chairman Gossage Sets Course for Growth

■ ***Divestitures, joint ventures, and emphasis on core businesses aim at leading troubled firm to higher profitability***

Marc S. Reisch,
C&EN Northeast News Bureau

Hercules chairman Thomas L. Gossage has no delusions about the company he inherited in January last year. It needs more fixing.

Gossage—the first Hercules chairman who did not begin his career at the company (he spent 26 years at Monsanto before joining Hercules in 1988)—is not shy about saying that businesses that cannot contribute earnings above the cost of capital will have to go. His statement put the company's resins and polypropylene film managers on notice, and resins in particular have begun to show a return to profitability.

Gossage is also not afraid to suggest that although Hercules has millions of dollars invested in the rocket motor business, it is a likely joint-venture candidate, should the right partner turn up. The same is true of the company's carbon fibers business, which, like rocket motors, is now in something of a rut, along with other businesses highly dependent on military and commercial aerospace contracts.

And Gossage says Hercules has been spending too much money on R&D and capital projects. This is changing even now. Money put into future-oriented projects will more closely reflect the company's financial capabilities.

But he is quick to note Hercules' successes last year: Cash flow was positive after being negative in 1990; reductions in personnel yielded $50 million in savings; operating profit as a percentage of sales grew to 6.4% from 5.9% in 1990; and employee morale improved.

Despite the difficult economy of 1991, Gossage says that "Hercules showed a considerable amount of improvement, and I think that we will continue to show that kind of improvement in 1992 and beyond. I don't think all our problems are behind us, but I think we have taken some major steps forward to become again what we once were—a good chemical company."

In the years between 1987 and 1990, the Hercules aerospace business faltered. The company also lost share of market in polypropylene film, and sold or shut down a number of businesses, including Simmonds Precision Instruments, polypropylene cigarette filter tow, and synthetic pulp. Hercules was ready for a change, says Gossage. "I firmly believe getting a few good years back to back is going to change the attitude of almost all employees and shareholders."

Operating profits before special charges rose 34% to $255 million in Gossage's first year at the helm. Although the improvements in earnings might not be so dramatic in the future, Gossage hopes they will continue to rise. In the past, he says, "we pulled ourselves into a shell and did not want to act out of fear of making a mistake." But that has already begun to change, he says, as employees "are more willing to step out and take risks. ... I think that those [companies] who take reasonably prudent risks make the difference between the reasonably successful company and the not-so-successful company."

Some outside observers also believe that with the employee reductions Hercules began to take last year, along with the sale or shutdown of underperforming and nonstrategic businesses, Hercules is indeed becoming a more successful company. Analyst James Wilbur, managing director of stockbroker Smith Barney, says he thinks the outlook for the company is favorable, and only a few weeks ago issued a buy recommendation for the company's stock. Hercules' stock has risen about 7.3% since the beginning of the year to $53⅛ per share compared with a 4% rise for the seven major chemical companies (including Hercules) that make up C&EN's own chemical stock index.

C&EN staff photo

Gossage: some major steps forward

Credit analyst Bruce James, assistant vice president of Moody's Investor Service, says Hercules' chemicals businesses in particular have "turned around nicely." Excluding unusual charges, 1991 was the third year in which the company showed improved operating margins. In fact, says James, they were the best results Hercules has delivered since the mid-1970s.

Other analysts, however, are puzzled over just what kind of company Hercules really is. One stock analyst tells C&EN that "Hercules has become an orphan," because it has transformed it-

self and taken so many different directions in the past 10 years. The analyst specifically refers to Hercules' numerous joint ventures with Montedison, ranging from the polypropylene joint venture Himont (which it finally sold off to Montedison in 1987) to Moplefan, the European-based polypropylene film and fiber venture. Also mentioned is the company's confusing forays into aerospace electronics and instrumentation. Business analyst J. Charles Forman of Forman Associates Consulting & Technical Services, Darrien, Conn., says quite bluntly: "If they could get rid of those rockets, they would have a much better company."

But Hercules' chairman says he is not about to jettison the aerospace business. "I certainly do not want to imply that we have become disenchanted with aerospace," he says, even as he acknowledges that Hercules continues to have problems with its aerospace business. Among those problems: the Titan IV rocket motor business. In 1989 Hercules took a $323 million write-off largely related to the Air Force's missile program. A test of the motor failed a year ago, but Hercules is betting that a test scheduled in the next few weeks will be more successful.

Gossage says aerospace "is an important segment of our business. I think it can be a healthy and significant contributor." But it might better contribute to Hercules' earnings as an unconsolidated affiliate. "I certainly would not discount the possibility of some sort of joint venture or alliance with somebody somewhere along the way." However, that will not happen immediately, says Gossage. Hercules is still determined to make a success of Titan, "so through 1992 I see us [as] a very significant chemical company trying to position ourselves more effectively in [the chemical] industry," while the company also works to make its aerospace business more profitable.

On the chemicals side of its business, the Hercules chairman says that when he took over the company a year ago, both polypropylene film and resins were operating "with returns certainly below our cost of capital." A year later "our resins business has stepped up to the challenge" of producing higher returns, and "made a significant contribution to our income in 1991." On the other hand, says Gossage, "our polypropylene film business has attempted to make that same kind of move forward with less success."

Hercules ultimately may decide not to sell either its resins or its films business, says Gossage. They are both moving to a position where they will allow Hercules to reach its goal of a 14% return on stockholder equity in the next five years—far higher than the 5% return in both 1990 and 1991. Its return on equity in first-quarter 1992 was 7.8%.

Smith Barney's Wilbur thinks Hercules' 14% goal is a reasonable, if modest, one. He points out that others in the chemical industry have higher goals. Du Pont's goal is 16%, Monsanto's is 20%, PPG's is 18%, Engelhard's is 15%. Average return on equity of the companies that make up the Standard & Poors 500 is 15%, he points out. "You can't expect everyone to be above average," says Wilbur, "but this puts them a little below average."

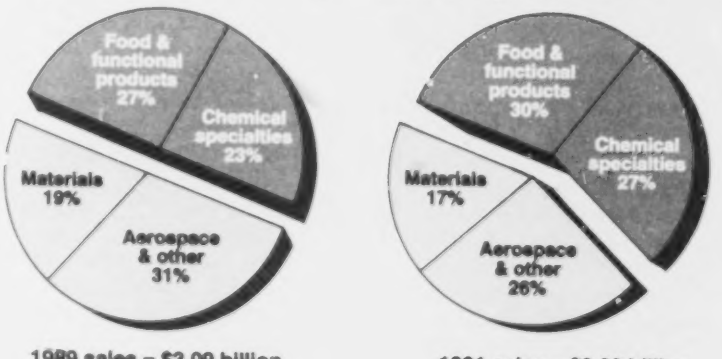
A significant factor in Hercules' efforts to improve its return to stockholders is its aim to operate more efficiently. Employee cutbacks in the range of 2500 over the past year helped "take over $50 million out of our indirect [cost] base in 1991," says Gossage. Capacity rationalizations and productivity gains, particularly in resins but also in other businesses, such as aerospace, also helped reduce the company's costs, he says. And Hercules has pushed to get "decisions made within the organization at the lowest possible level. . . . We were not, in fact, a company that was holding our people accountable for cash flow prior to 1991, which is pretty amazing."

To improve its competitive position, Gossage says Hercules will continue to look into joint ventures. The company recently completed a flavors and citrus specialties joint venture with Imcera, which "is an example of two very profitable, very attractive flavor companies that were not significant players" in the business. By putting them together, he says, "we now have a company that is indeed a significant player, and I think it is going to be a major flavor house in a couple of years. We would like to do more of that sort of thing."

In addition to a possible aerospace joint venture in the future, Gossage says Hercules recently discussed a joint venture of its carbon fiber and composites businesses with an unnamed partner. However, the proposed venture did not work out. "We had very serious discussions under way," he says, for creating an alliance with another company in which it brought certain strengths and Hercules brought certain strengths. "With the rationalizations that are taking place in advanced materials, it would have been a major move."

James L. Ma, a senior consultant for SRI International, suggests the reason Hercules and others might consider combining carbon fiber and composites businesses with those of a competitor is that today these businesses are growing more slowly than they once were. They are now affected not only by government defense cutbacks and commercial aerospace slowdowns, but also by stagnating markets such as sporting equipment. And new markets such as composites for use in auto parts have never developed as was hoped. That is true not only because of high carbon fiber prices ($10 to $12 per lb for some grades), but also because of the complex fabrication techniques necessary to form parts.

Food products, chemical specialties are growth areas



"I think our commitment in Bitterfeld, which was not easy for us in the present economic climate, shows we are facing up to our responsibility," Strenger added.

Much of the investment spending in the eastern states is going toward environmental cleanup and modernization—steps the German chemical industry is already familiar with in the western states.

Hoechst is a typical example. Its operating costs for all units involved in environmental protection last year were $662 million, with another $125 million invested for the purpose. More than 680 employees work full-time in the environmental protection sector, the company reports.

In Germany alone, Hoechst is operating 22 large-scale wastewater treatment units. At the company's home complex near Frankfurt, it will soon be installing a further cleaning stage for the flue gas from its residue incineration plant and it is working to set up material recycling schemes. It has already started projects to recycle polypropylene, polyvinyl chloride, polyacetal, and polyester, and its chlorofluorocarbon refrigerants are to be marketed with a "take-back" guarantee.

After considerable debate, the German chemical industry has adopted the rubric of the Responsible Care program to cover its industrywide environment, health, and safety program. Among the reasons for the debate and delay is the firm belief among many German chemical manufacturers that the Responsible Care program, sponsored by the U.S.'s CMA and similar associations in other countries, represents an actual lowering of standards from the German "Chemie im Dialog" public commitment.

The industry is proud of its pollution reduction record. For example, it has reduced organic contaminants and heavy metals in its effluents by more than 90% during the past 25 years, although production of all chemicals has almost tripled. Between 1979 and 1990, sulfur dioxide emissions to the atmosphere were trimmed 69%, nitric oxide emissions 54%, and organic compound emissions 66%. In 1990, companies created an association to develop a recycling system for plastic materials and to promote recycling and the marketing of recycled products. Despite the current low prices of petroleum and natural gas, the industry has not suddenly developed wasteful habits, squandering energy in its processing and plant operations.

Considering the chemical industry's past efforts, many in the industry feel a sense of aggrievement as state governments pass more and more regulations and laws concerning environmental standards.

Bayer's Strenger, for one, has called for a period of consolidation for laws to be sorted out and implementation plans developed. As he told shareholders in April, "I am worried about the disproportionate rise in environmental protection costs, which no longer bear any relation to the benefits they bring and are endangering our competitiveness. We are not asking for standards to be lowered—we want to see further progress in this field. But we do need a different environmental policy if we are to achieve this."

Among the environmental moves affecting the industry is the campaign of the federal environment minister, Klaus Töpfer, to transform the German society from a "throwaway" society to one devoted to recycling. Key to his campaign is a new set of laws that force manufacturers and distributors to take back the packaging for their products, and the products themselves at the end of their useful lives.

By the beginning of next year, for example, 50% by weight of all packaging must be collected, with 30% of the plastics, 70% of the glass, 65% of the tinplate, and 60% of the aluminum, paper, and cardboard recycled. That effectively translates to about 2.4 billion lb per year of plastics alone, if the targets are met. Moreover, by July 1995, the totals increase to 80% of packaging materials to be collected, with the reprocessing of 80% of plastics, and 90% of glass, tinplate, and aluminum.

Strube: innovation stifled

Incineration will not count as a reprocessing method, although the German government accepts the concept of chemical recycling, if it can be worked out economically. Incineration of plastic waste would have been the answer to meeting the target date, chemical companies believed—BASF, for one, was developing a scheme for deriving energy from the incineration of plastics. Now, the industry—as the ultimate supplier of plastic materials—is turning to developing technology for chemically recycling polymers for reuse. Under the aegis of the German Association for Recycling Used Plastic Packaging, the chemical industry recently sponsored what was termed a "successful large-scale experiment," at a coal-oil installation in Bottrop, Germany, where oil residues from crude-oil refineries are processed. The mixed and soiled plastic waste from household garbage was converted by hydration into high-quality oil that in turn was treated at the Ruhröl Refinery in Gelsenkirchen, for use as plastics feedstocks.

The green dot system—devised by Duales System Deutschland for recovering packaging waste and by which a green dot is placed on recyclable packaging—still has a long way to go to meet the targets set by Töpfer, who has ruled out any time extensions. Current recycling capacity is being swamped, and even the prospect of constructing several new recycling plants won't help all that much—the total capacity by year's end is expected to be about 220 million lb per year, or only about one tenth of what is needed. One result is a slowdown through the chain of product manufacture, distribution, and sale. Another is the export, still legal, of collected wastes to other European countries, in turn overwhelming recycling facilities and markets for recyclable waste in those countries.

Another major concern for the industry is the threat of a federal carbon tax, a levy on carbon dioxide emissions, which would be significantly higher than the tax proposed by the Commission of the

European Community, which would effectively add $10 to the price of a barrel of oil by the end of the century.

"The energy consumption of our industry—the energy consumption per thousand deutsche marks of gross value added—has been strongly reduced during the past 30 years: with electricity, it dropped by 40% and with fuels, by 75%," according to Hilger. "To bring about such achievements, we do not need any targets stipulated from the outside," particularly as part of a national, rather than international or global, effort to tackle environmental problems, he said.

Other industry executives join Hilger in his arguments against such a uninational tax. It is scientifically irrational, they say, and economically unworkable. However, privately, others in the industry gloomily expect a carbon tax to be passed anyway. The prospect of handsome tax revenues will be too enticing for politicians to turn down on mere scientific grounds, they predict.

If such a tax is passed, it will be just one of the burdens with which the German chemical industry will have to cope. Another is the increasing challenge to prevent erosion of the country's hard-earned productivity through escalating social and employment costs.

For example, VCI began its rounds of negotiations with labor unions shortly after Germany was racked by public-sector labor strikes that were settled with contracts featuring a 5.4% wage increase. VCI, working through the Bundesarbeitgeber Verband Chemie—the Association of Chemicals Employers—reached a basic 5.1% settlement with the chemical union, the IG Chemie. Included was an agreement to trim the workweek gradually from 39 hours to 37.5 hours by 1996.

"There has been a very realistic relationship between the chemical industry and the union, for a very long [illegible]," observed one industry executive. "Our workers have benefited from this."

It remains to be seen, however, whether this "realistic relationship" changes in the future: IG Chemie is in the process of merging with the union of miners, considered a highly aggressive union. Said another negotiator: "We are anxious to see what culture emerges. What we have had so far is a good, results-oriented relationship. Efficiency has been very important on both sides."

Such challenges are encouraging the German chemical industry to proceed in its shift within Germany from bulk and basic chemicals to higher value-added and fine chemicals. Pharmaceuticals, for example, now make up the largest single sector in the German industry. Bulk plastics are being de-emphasized in favor of more specialty polymers. And the industry has almost completely phased out its fertilizers operations.

Of Germany's Big Three companies, only Bayer—with the largest involvement in pharmaceuticals—did not trim its dividend to shareholders in 1991. Although its profits dropped slightly, the drop was not so large as the profit declines from 1990 were for the other two. And Henkel, with its extensive consumer-product businesses in detergents and personal care products, showed an increase in profits for the year.

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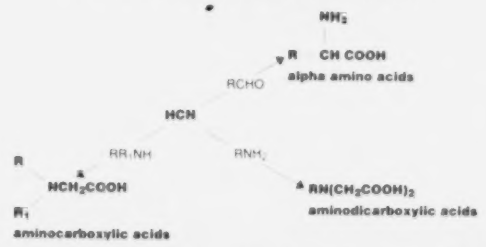

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In fact, Henkel's Winkhaus, when asked about current business levels, said: "We are content. The start of 1992 is a good start," with sales up 16% for the first quarter. "Maybe it won't keep on at that rate through the year—a recession is coming up in Germany, and that is our most important market." Nonetheless, he is optimistic about 1992.

That is not to say that German chemical companies are pulling out of the bulk chemicals business—only that when it comes to Germany itself, they are changing their investment strategy.

For example, BASF, the most bulk-oriented of the Big Three, says that logistics are playing an increasingly important part in making investment decisions. The company's basic chemicals division, for example, operates out of many sites, including its home base in Ludwigshafen—often touted as the largest chemicals complex in the world—as well as in Antwerp, Belgium; Geismar, La.; Pernis, the Netherlands; and Guarantinguetá, Brazil.

Company officials pointed out that it is more expensive to supply Ludwigshafen, an inland river city, with raw materials than to supply a site on the coast. Antwerp, on the other hand, is close to the sea, with access to competitively priced supplies of raw materials and energy. "It is no wonder that most of the substantial volume of the division's capital expenditures are being allocated to Antwerp," said a company planner.

In part, investments outside Germany are sound marketing decisions. As Winkhaus pointed out, "We have to follow the customers and take our production close to them," an important point as the German industry—like the chemical industry elsewhere—becomes more and more international. But also in part, they are a reflection of the political climate that has developed during the past several years in Germany.

To some extent, the political climate is a function of direct action by the various governmental bodies—state and federal—within the country. Companies cite the plethora of environmental regulations, for example, that they must cope with. Sometimes, it is a function of action and inaction: For example, authorizations needed for new plants or new processes drag out, causing problems with marketing and investment plans.

Said one chief executive: "If a marketing plan says a plant must go on stream in two years, and in Germany approval

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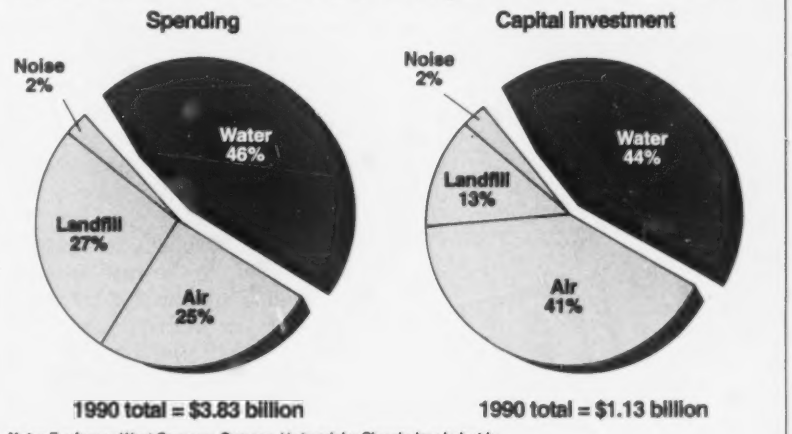
could take four years whereas in Belgium it would take two, this difference in timing plays a big role in making decisions. Our managers are reacting rationally, doing the job as best they see it."

BASF's chairman Jürgen Strube agreed. "It stifles innovation when authorities take far too long to evaluate projected production plants," he said. "Processing applications for chemical plants takes considerably longer in Germany than it takes at any other European sites."

Stube's colleague Wolfgang Jentzsch, a BASF director, noted: "We are not an industry that can just pack up its sewing machines, ship and install them in a simple shed in Thailand several weeks later, and then continue to manufacture shirts there. We cannot simply move our ammonia plant or steamcracker from Ludwigshafen to Antwerp, but also not vice versa. Once these new plants are built in Antwerp rather than in Ludwigshafen, they will stand there for 20 to 30 years to come, continuing to serve as a powerful magnet for users of these basic chemicals."

Water dominates chemical industry's environmental costs



Note: For former West Germany. Source: Verband der Chemischen Industrie

Even where local or state laws have been superseded by federal legislation, however, there can still be problems. The cause célèbre for the German chemical industry is biotechnology—specifically, the field of genetic engineering.

Until 1990, legislation concerning the field—a highly emotional one for Germans still living with memories of the Nazi past—was fragmented, conflicting, hesitant. Federal legislation designed to establish a framework to promote industrial use of this technology was passed in 1990. But it hasn't quite worked.

Bayer's Strenger can be thoroughly detached about the subject. His company elected early on to concentrate its genetic engineering research in the U.S. "Our decision to expand our involvement in this new technology in the U.S. was partly influenced by our disappointing experience with genetic engineering in Germany," he said.

"The way the German authorities have handled this legislation has so far failed to create the clear-cut legal situation that is so badly needed," he continued. "The position in the U.S. is completely different. The Americans have realized that industrial use of genetic engineering needs to be promoted as much as possible in the interest of the country and its economic development. It is to be feared that Germany will lag behind in this technology of the future; it may already have lost so much ground that it will not be able to catch up with other countries."

For Hoechst and Hilger, the challenge—and frustration—has been more direct. The company worked through the latter half of the 1980s for planning consent for a new biotechnology unit, but even with the national legislation no approvals came. Hoechst finally gave up on getting German authorization and decided to concentrate its genetic engineering work in the U.S. and Japan.

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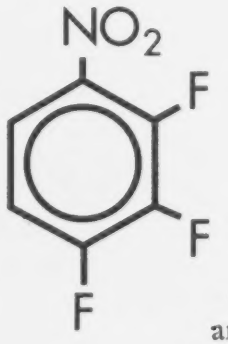

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Hence, at his press conference in Bonn, Hilger's comments on the subject had a certain bite, as he argued on behalf of VCI before the country's political press. "Two years ago," he pointed out, "the genetic engineering act was adopted with the objective to secure the safe development of this technology of the future. The chemical industry expressly welcomed the act, because it offered reliable framework conditions for our activities." The results were different however. "Our experience shows that the restrictive, bureaucratic, and overloaded enforcement of the act—that public authorities do not even uniformly apply on the federal level—paralyzes development." Nothing is happening in the sector, he said, not in industry or in university research.

"Reasons for the rejection of genetic engineering are most probably the fantastic ideas and the perfectly wrong contexts in which this subject is discussed in Germany," he suggested. Such industrial applications as genetically modified enzymes and pharmaceutical products and diagnostics have become intermingled in people's thinking with prenatal diagnostics, artificial insemination, genome analysis, and embryo protection.

"A clear differentiation is necessary, both in assessment and in action. Are important products and future-oriented processes to fail because socially binding solutions can be found for other issues?" he asked. "And what about production? Why should it be built up in Germany? Certainly not for reasons of logistics. The annual production of a genetically engineered active substance used in the pharmaceutical industry, a hematogenic hormone, can be sent in an airmail letter from Japan to Germany. But it is plain to see that the creation of value will remain in Japan."

The problems aside, however, the German chemical industry is fully aware of the strengths it already possesses, both within the country and as an industry. And as the recession forces companies to trim labor, shed out-of-date processes and capacity, and operate more tightly, the industry expects to remain competitive.

The current social and financial unrest running through the country following the unification of eastern and western Germany will fade, executives agree. It has been a painful, but necessary, experience. The economy will slow somewhat this year, particularly following the Bundesbank's efforts to curtail inflation by keeping interest rates high. But the slowing will enable chemical manufacturers to turn some attention to the export market once again, after frothy domestic demand led to more emphasis on imports during the past several years.

Indeed, as the unified market settles down, the German chemical industry will have an even better position in the center of Europe to influence or supply the markets opening up in the Eastern European countries. That is a long-term goal, of course, given the current conditions in the former East bloc—but the German chemical industry intends to be around, as a very tough competitor, for the long term. □

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